CLAIMS

We claim:

1. A cooling device comprising:

a heat producing source that emits fluorescent energy;

at least one layer of fluorescent energy absorbing material positioned adjacent to said heat producing source; and

a coolant medium in fluid contact with said at least one layer of fluorescent energy absorbing material wherein said at least one layer of fluorescent energy absorbing material and said coolant medium cooperate to maintain a temperature level of said heat producing source below a predetermined level.

2. The cooling device as recited in claim 1, wherein said at least one layer of fluorescent energy absorbing material comprises sapphire.

3. The cooling device as recited in claim 1, wherein said at least one layer of fluorescent energy absorbing material includes at least one textured surface for diffusing fluorescent light.

4. The cooling device as recited in claim 1, wherein said at least one layer of fluorescent energy absorbing material comprises a coating for diffusing fluorescent light.

5. The cooling device as recited in claim 1, wherein said heat producing source comprises a diode pumped laser slab.

6. The cooling device as recited in claim 1, wherein said at least one layer of fluorescent energy absorbing material comprises a plurality of stacked layers of fluorescent energy absorbing material with each layer including a plurality of fluid orifices and fluid channels that cooperate with each other to define a fluid flow pathway for said coolant medium through said stacked layers to form an impingement cooling device.

7. The cooling device recited in claim 6, wherein said at least one layer of fluorescent energy absorbing material includes at least one storage channel having a thermal energy storage material disposed therein.

8. The cooling device recited in claim 7, wherein said thermal energy storage material comprises at least one of a phase change material and a room temperature vulcanizing elastomer, said room temperature vulcanizing elastomer including a filler, and wherein said filler includes at least one of beryllium oxide and aluminum oxide.

9. The cooling device recited in claim 7, wherein said at least one storage channel comprises at least a first and second storage channels with each of said first and second storage channels having a thermal energy storage material disposed therein, wherein said first and second storage channels are non-colinear.

10. The cooling device recited in claim 9, wherein said first and second storage channels are formed in different layers of said plurality of stacked layers and are offset from each other relative to said heat producing source.

11. The cooling device recited in claim 9, wherein said first and second storage channels are formed in the same layer of said plurality of stacked layers.

12. A method for cooling a heat producing source comprising the steps of:

(a) positioning at least one layer of fluorescent energy absorbing material adjacent to a heat producing source;

(b) absorbing emitted fluorescent energy from the heat producing source with the at least one layer of fluorescent energy absorbing material; and

(c) cooling the fluorescent energy absorbing material with a coolant medium.

13. The method for cooling a heat producing source as recited in claim 12, wherein the fluorescent energy absorbing material comprises sapphire.

14. The method for cooling a heat producing source as recited in claim 12, including the steps of forming at least one textured surface on the at least one layer of fluorescent energy absorbing material, and diffusing fluorescent light with the at least one textured surface.

15. The method for cooling a heat producing source as recited in claim 12, including the steps of depositing a coating on the at least one layer of fluorescent energy absorbing material, and diffusing fluorescent light with the coating.

16. The method for cooling a heat producing source as recited in claim 12, wherein the heat producing source comprises a diode pumped laser slab.

17. The method for cooling a heat producing source as recited in claim 12, wherein step (a) further includes forming an impingement cooling device by positioning a plurality of stacked layers of fluorescent energy absorbing material adjacent to the heat producing source, and forming a plurality of fluid orifices and fluid channels in each layer that cooperate to define a fluid pathway for the coolant medium.

18. The method for cooling a heat producing source as recited in claim 17, including the steps of forming at least one storage channel in the at least one layer of fluorescent energy absorbing material and depositing a thermal energy storage material within the storage channel.

19. The method for cooling a heat producing source as recited in claim 18, wherein the thermal energy storage material comprises a room temperature vulcanizing elastomer including a filler that includes at least one of beryllium oxide and aluminum oxide.

20. The method for cooling a heat producing source as recited in claim 18, including the steps of forming non-colinear first and second storage channels in the plurality of stacked layers and depositing a thermal energy storage material within the first and second storage channels.

21. The cooling device recited in claim 20, including the step of forming the first and second storage channels in the same layer.

22. The cooling device recited in claim 20, including the steps of forming the first and second storage channels in different layers and offsetting the first and second storage channels relative to the heat producing source.

23. A cooling device comprising:

a heat producing source that emits fluorescent energy;

a plurality of stacked layers of material having a first layer that is positioned adjacent to said heat producing source, wherein each of said plurality of stacked layers includes a plurality of orifices and channels that define a fluid pathway;

at least one groove formed in said first layer to increase an exposed surface area of said first layer that is exposed to said heat producing source; and

a coolant medium in fluid contact with said plurality of stacked layers, wherein said coolant medium cooperates with said fluid pathway and said exposed surface area to maintain a temperature level of said heat producing source below a predetermined level.

24. The cooling device as recited in claim 23, wherein said material includes at least one of copper and sapphire.

25. The cooling device as recited in claim 23, wherein said groove extends entirely through said first layer and into at least a second layer of said plurality of stacked layers.

26. The cooling device as recited in claim 23, wherein said plurality of layers are bonded together.